Australian Government

Patent Office
Canberra

I, LEANNE MYNOTT, MANAGER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003905774 for a patent by SDS METAL CRAFT PTY LTD as filed on 21 October 2003.

COMMONWEALTH OF AUSTRALIA
AUSTRALIA
PATENT OFFICE

WITNESS my hand this
Sixth day of September 2005

LEANNE MYNOTT
MANAGER EXAMINATION SUPPORT AND SALES

SDS Metal Craft Pty Ltd

AUSTRALIA

PATENTS ACT 1990

PROVISIONAL SPECIFICATION FOR AN INVENTION ENTITLED:-

"AN IMPROVED ROTARY SAMPLE COLLECTOR"

This invention is described in the following statement:-

This invention relates to an improved material sample collector, and in particular to a sampling collection device for geological sampling materials; however, it should be appreciated that the invention is not necessarily limited to such materials and may have application in other technical fields where sampling of flowable solid materials is required.

In geological sampling, it is important that the sample collected be of a controlled portion and representative of the material being sampled so that subsequent testing of the sample reveals characteristics which can be realistically related to the whole of the bulk sample material and to their source. Problems which exist with known geological sampling material collection devices include variabilities in distribution and subsequent sampling catchment as a result of:

(i) particle size variation within the material;

(ii) moisture content variation within the material;

(iii) upstream material flow dynamics (average and flow cross-sectional velocity variation); and

(iv) stickiness of material, between the material particles and the collection surface of the sampling device, which can result in lumps.

It is the main object of the present invention to provide an improved sample collection apparatus which is designed for taking continuous and representative samples of material from a larger quantity of sampling material, in an extremely simple and effective manner.

It is another object of the present invention to provide an improved sample collection apparatus which is designed to allow samples of a pre-determined proportion of the total sampling materials flowing through the apparatus, to be collected.

It is a further object of the present invention to provide an improved geological sampling collection apparatus which is simple to construct and operate and which has the capacity to effectively operate with materials regardless of the moisture content thereof.

Broadly according to this invention therefore, sample collector apparatus for collecting samples of flowable solid materials, comprise:

a housing,

a delivery opening in the upper end of the housing through which material to be sampled is delivered into the housing,

a deflector housed within said housing and having an upper end located below said delivery opening and walls which diverge downwardly from said upper end,

a sample receiving receptacle or port positioned at the lower end of said deflector at the periphery thereof for receiving a portion of the material flowing downwardly along one of the walls of the deflector, said sample receiving receptacle having downwardly converging walls terminating in an open bottom end,

drive means for rotating and supporting said deflector and said receptacle fast with one another or relative to one another,

a stationary sample collection chute disposed beneath said deflector and its associated said receptacle and having funnel forming upper end communicating with the discharge end of said receptacle during rotation of the receptacle, said sample collection chute having a lower end which is adapted to receive a sample bag into which the collected sample is delivered, and

a waste chute mounted at the lower end of the housing for collecting the portion of the material which is not collected by the sample collection chute.

In a preferred embodiment of the invention, the sample receiving receptacle is removably attached to the lower end of said deflector and projects radially outwards therefrom, whereby the deflector and the receptacle rotate together. Desirably the sample delivery receptacle is made in a range of different sizes so that the amount of sample material being collected can be varied. For example, in some instances, larger quantities of sampling materials may be required – in which case a larger width receptacle is selected and attached to the deflector.

Desirably the deflector is a vertically disposed cone having its upper apex end located approximately centrally beneath the delivery opening through which the material to be sampled is fed. In a preferred embodiment of the invention, the apex angle of the cone shaped deflector is approximately 51°. It will of course be appreciated that the angle of

incline of the downwardly divergent walls of the deflector should not be less than the angle of the repose of the granular material being sampled. This also applies to the walls of the sample receiving receptacle and the collection chute to thereby substantially eliminate any possibility of sample contamination when different sources of sampling material are processed at different times.

Desirably the drive means comprises an hydraulic motor having a vertically disposed output drive shaft to which is mounted the rotary conical deflector. Alternatively, the conical deflector used to split the incoming stream of material to be sampled can be stationary with the sample receiving receptacle mounted on a rotating arm driven by the hydraulic motor so that the receptacle rotates around the bottom perimeter edge of the stationary conical deflector.

In another preferred embodiment of the invention, the conical deflector is provided with a pair of sample receiving receptacles or ports on opposite sides thereof, with the receptacles being arranged to collect and deliver respective portions of material into respective stationary sample collection chutes, each mounted below the conical deflector and its associated sample receiving receptacle, whereby two separate samples from the same source of materials can be collected and subsequently compared to ensure that representative samples have been taken.

In order to further explain the present invention, two preferred embodiments thereof are described hereunder in further detail with reference to and as illustrated in the accompanying drawings wherein:

Fig. 1 is a schematic sectional elevational view of a sample collection apparatus made in accordance with a first preferred embodiment of the invention;

Fig. 2 is a sectional view along the line A A shown in Fig. 1;

Fig. 3 is a view similar to Fig. 1 of a sample collection apparatus according to a second embodiment of the invention; while

Fig. 4 is a view similar to Fig. 2.

Referring to the embodiment shown in Figs. 1 and 2 of the accompanying drawings, there is shown a sample collection apparatus 10 which includes a housing 11 which

encloses a rotary conical deflector 12 which has its apex end 13 disposed approximately centrally beneath a material feed inlet opening in the upper end of the housing 11 so that material flowing into the collector apparatus is separated or split into a number of streams which flow downwardly over the downwardly divergent walls 14, 15 of the deflector 12.

In this embodiment, the conical deflector 12 is rotated by means of an hydraulic motor 16 which has its output drive shaft extending vertically upwards so as to coincide with the central vertical axis of the deflector 12.

Attached to the lower end of wall 14 of the deflector 12 and projecting radially outwards therefrom is a sample receiving funnel-shaped receptacle 20 which thereby rotates with the deflector 12 and is designed to collect a portion of the material flowing downwardly over the deflector wall 14. The funnel-shaped receptacle 20 has downwardly convergent walls terminating in an open bottom end arranged so that, during rotation of the receptacle 20, the material collected by the receptacle 20 is delivered into the open upper end of a stationary sample collection chute 22. In this embodiment the sample collection chute 22 comprises an upper funnel portion 23 which joins to a downwardly inclined discharge tube 24 which is arranged to discharge the material delivered into the funnel portion 23 into a sample bag or receptacle positioned over the open bottom end of the tube 24.

A funnel-shaped waste chute 25 is attached to the bottom end of the housing 11 and is shaped and sized so as to collect the non-sampled portion of the material flowing through the collector apparatus 10 for discharge to waste. In this embodiment the waste chute 25 forms an integral part of the housing 11 and has its bottom discharge end 26 co-axially aligned with the central vertical axis of the housing.

As shown in Fig. 2 of the drawings, the sample receiving receptacle of funnel 20 has inner and outer walls 27, 28 respectively which are interconnected by radially extending side walls 29, 30 which converge radially inwards, with the outer wall 28 sloping inwardly from its upper end to its lower end, with the angle of slope for each of the walls being sufficient to ensure that material fed into the receptacle 20 does not stick thereto. In

this embodiment the sample receiving receptacle 20 is removably fitted to the bottom edge of the deflector 12 and hence can be readily replaced with a new receptacle or a receptacle having a different angular width so that a different proportion of the sampling material flow through the collector apparatus can be collected and sampled.

Referring to the embodiment of the invention shown in Fig. 3 of the drawings, the sample collector apparatus is modified so that it provides duplicate sampling capabilities by having a pair of diametrically opposed sample receiving receptacles 35, 36 attached to opposite sides of the conical deflector 12 and a pair of stationary sample collection chutes 38, 39 for respectively collecting material sample portions delivered by the receptacles 35, 36. In this way duplicate representative samples can be collected and tested to ensure that both samples have consistent characteristics and hence are truly representative of the material being sampled.

In the second embodiment, the sample receiving receptacle 36 extends further vertically downwards than that of the other diametrically opposite sample receiving receptacle 35, while its associated sample chute 39 has its open upper end disposed at a lower level than that of the other collection chute 38.

It should of course be appreciated that the receiving receptacles 35, 36 do not have to communicate with their associated collector chutes 38, 39 during an entire revolution thereof. In some instances, the collection chutes can be arranged so that collected material discharges into the collection chutes during part only of their rotational movement.

In a non-illustrated variation of the present invention, the conical deflector 12 is mounted as a stationary member within the housing while the sample receiving receptacle or port is arranged to be rotated by suitable drive means, whereby the deflector and the receptacle rotate relative to one another.

It will of course be appreciated that for different types of granular or particulate materials to be sampled, the size of the included apex angle of the conical deflector may need to be varied, as may also the rotational speed of the deflector (or the rotational

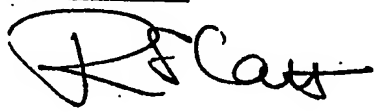
speed of the receiving receptacles in the situation where the deflector is stationary). A rotational speed of around 14 rpm has been found to be most preferred. These are variables which essentially depend on the type of material to be sampled, and in particular the amount of its moisture content – it being appreciated that very moist material will tend to stick onto the surfaces of the components of the collection apparatus.

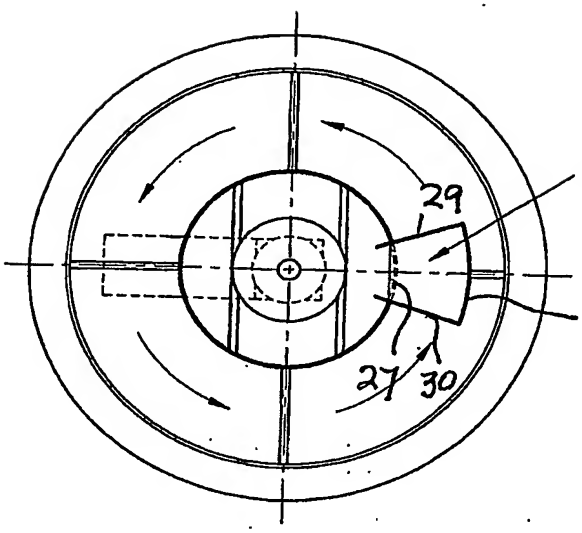
A brief consideration of the abovedescribed embodiments will indicate that the invention provides a very simple and effective sample collection device for geological sampling and which allows a controlled proportion representative of a large quantity of sampling material, to be collected – regardless of the particle size variation, moisture content variation and stickiness of the material to be sampled.

Although the invention has been described herein by reference to specific embodiments, it is not intended to be limited thereto but to include any variations and modification which fall within the true spirit and scope of the invention.

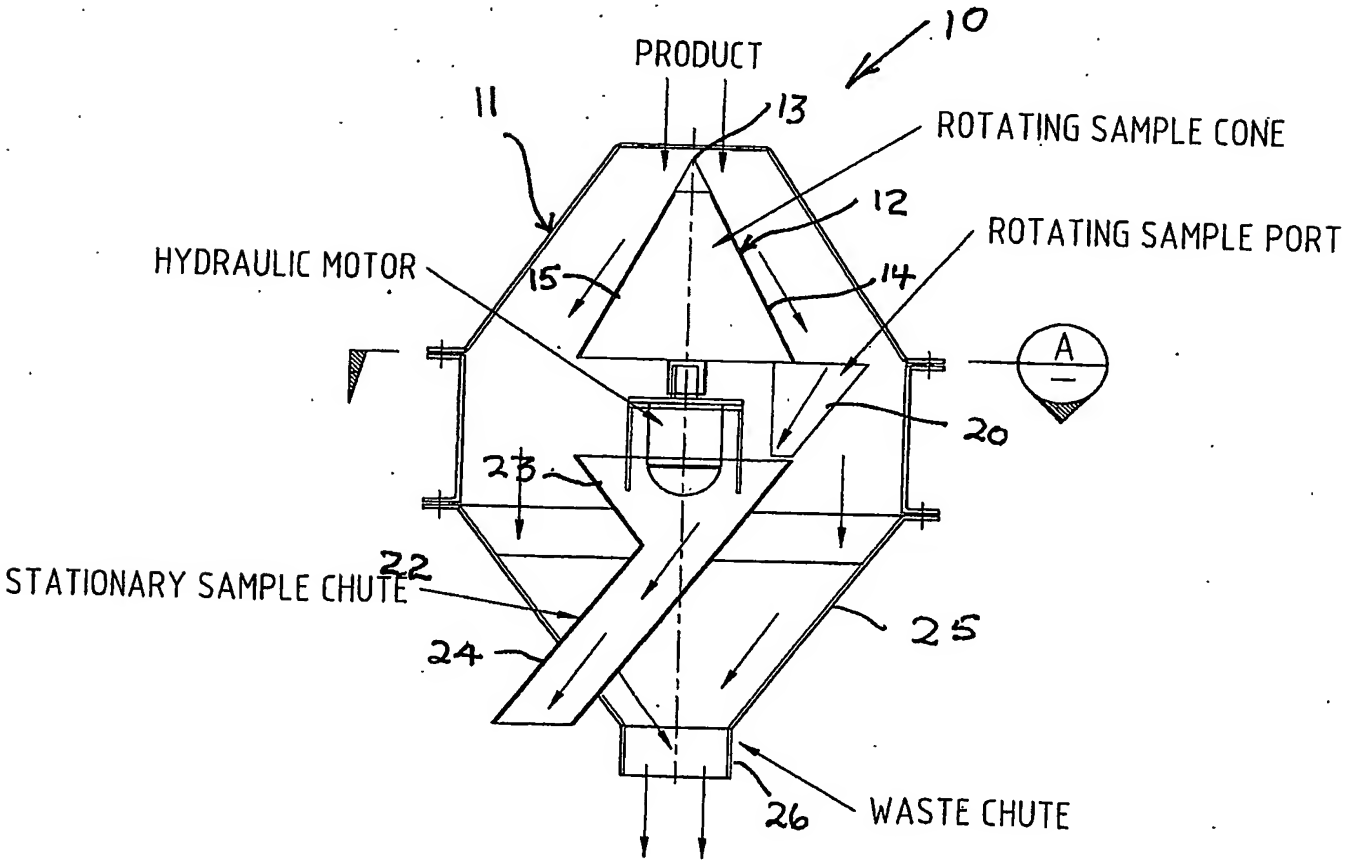
Dated this 21st day of October 2003.

SDS Metal Craft Pty Ltd
By its Patent Attorneys
MADDERNS



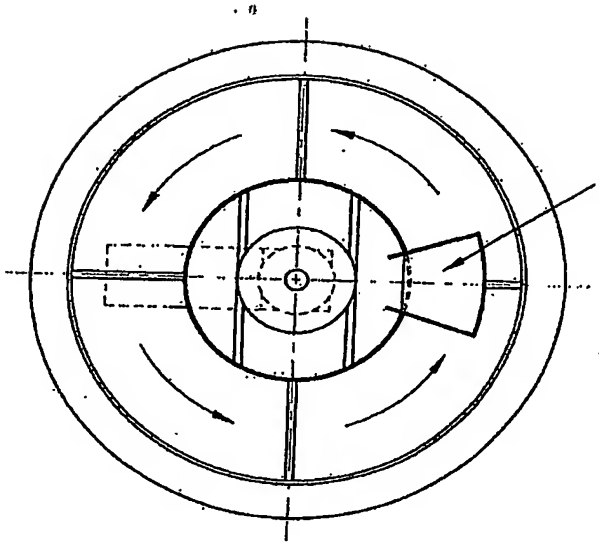


SECTION A — FIG 2



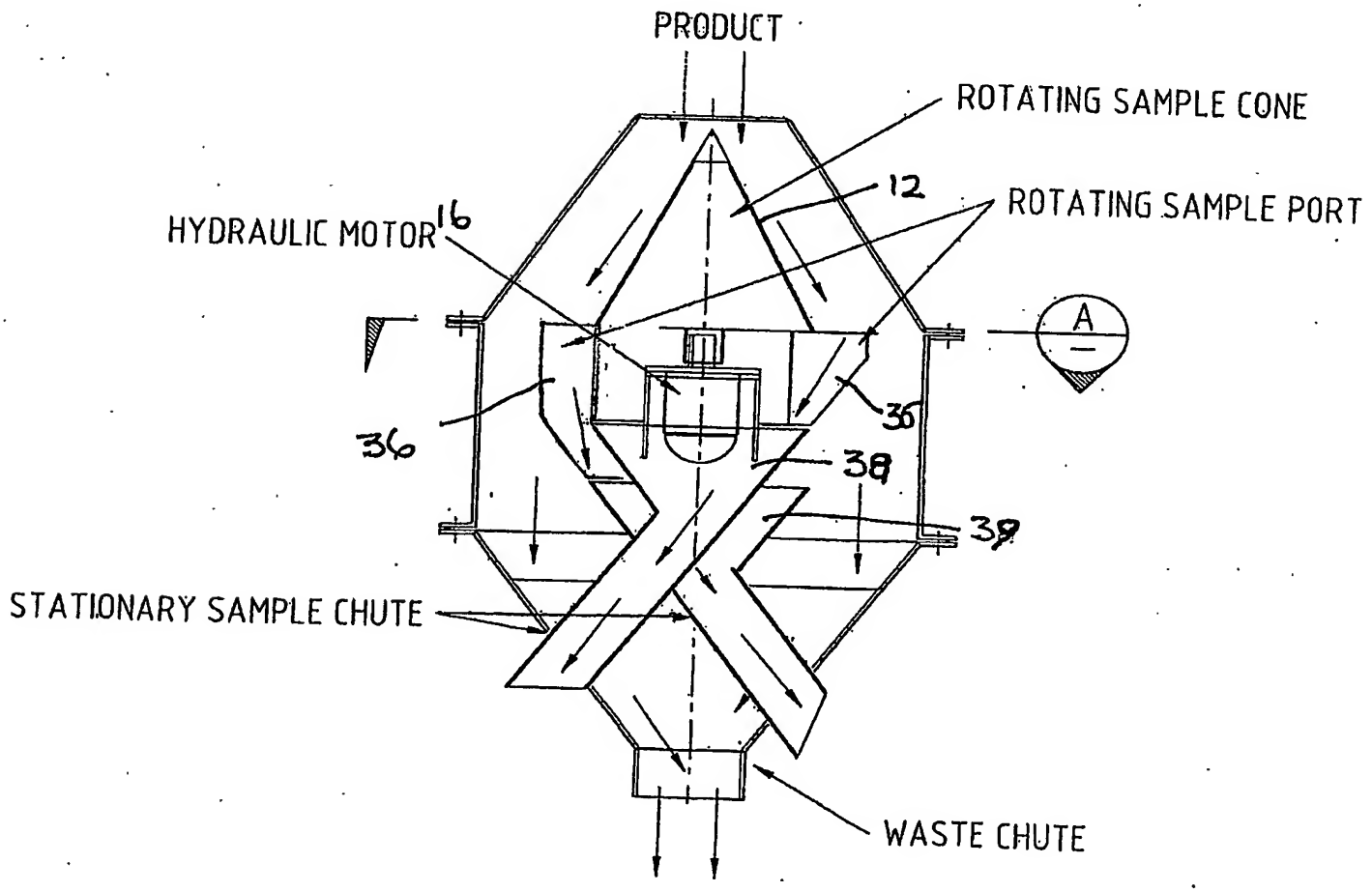
ELEVATION

FIG 1



SECTION A

FIG 4



ELEVATION

FIG 3

Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/IB04/004441

International filing date: 21 October 2004 (21.10.2004)

Document type: Certified copy of priority document

Document details: Country/Office: AU
Number: 2003905774
Filing date: 21 October 2003 (21.10.2003)

Date of receipt at the International Bureau: 17 October 2005 (17.10.2005)

Remark: Priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b)

World Intellectual Property Organization (WIPO) - Geneva, Switzerland
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse